

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

24 Karat Gold

The background image shows a surveying team in a field. In the foreground, a person wearing a green shirt and a hard hat is operating a surveying instrument on a tripod. In the background, another person is visible, also working with a surveying instrument. The field is open and grassy, with a clear sky.

CE-205 SURVEYING – I

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Course Aims

- **To provide basic knowledge on theory and practices of land surveying.**
- **To introduce students to the basic surveying instruments for field applications, and preparation of surveying maps.**

Course Intended Learning Outcomes (CLOs)

- 1. To define and explain the basic surveying techniques used for surveying and leveling.**
- 2. To make use of various survey equipment's for measurements with required accuracy.**
- 3. To utilize the basic knowledge of mathematics in performing the necessary calculations and computations in land surveying.**
- 4. To develop maps and plans, contour maps, profiles, cross-sections, etc. using surveying**

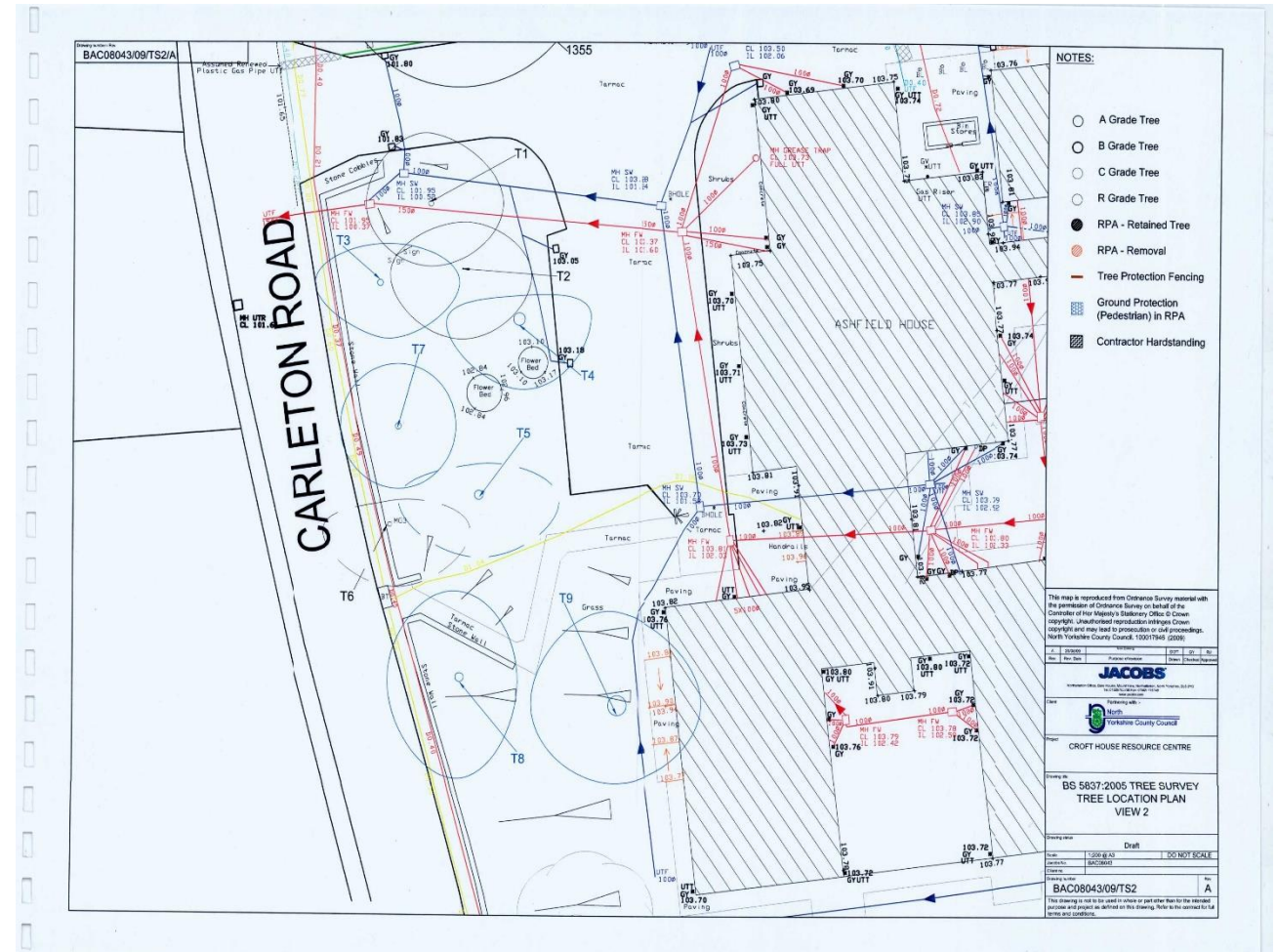
Topics to be Covered

- 1. Introduction to land surveying**
- 2. Definitions of basic surveying terms branches and their application,**
- 3. Instruments used**

Introduction to land surveying

1. Introduction to land surveying

Surveying is the **technique** for determining the **relative positions** of different features **on, above or beneath** the surface of the earth by means of **direct or indirect** measurements and finally **representing** them on a sheet of paper called Plan or Map.



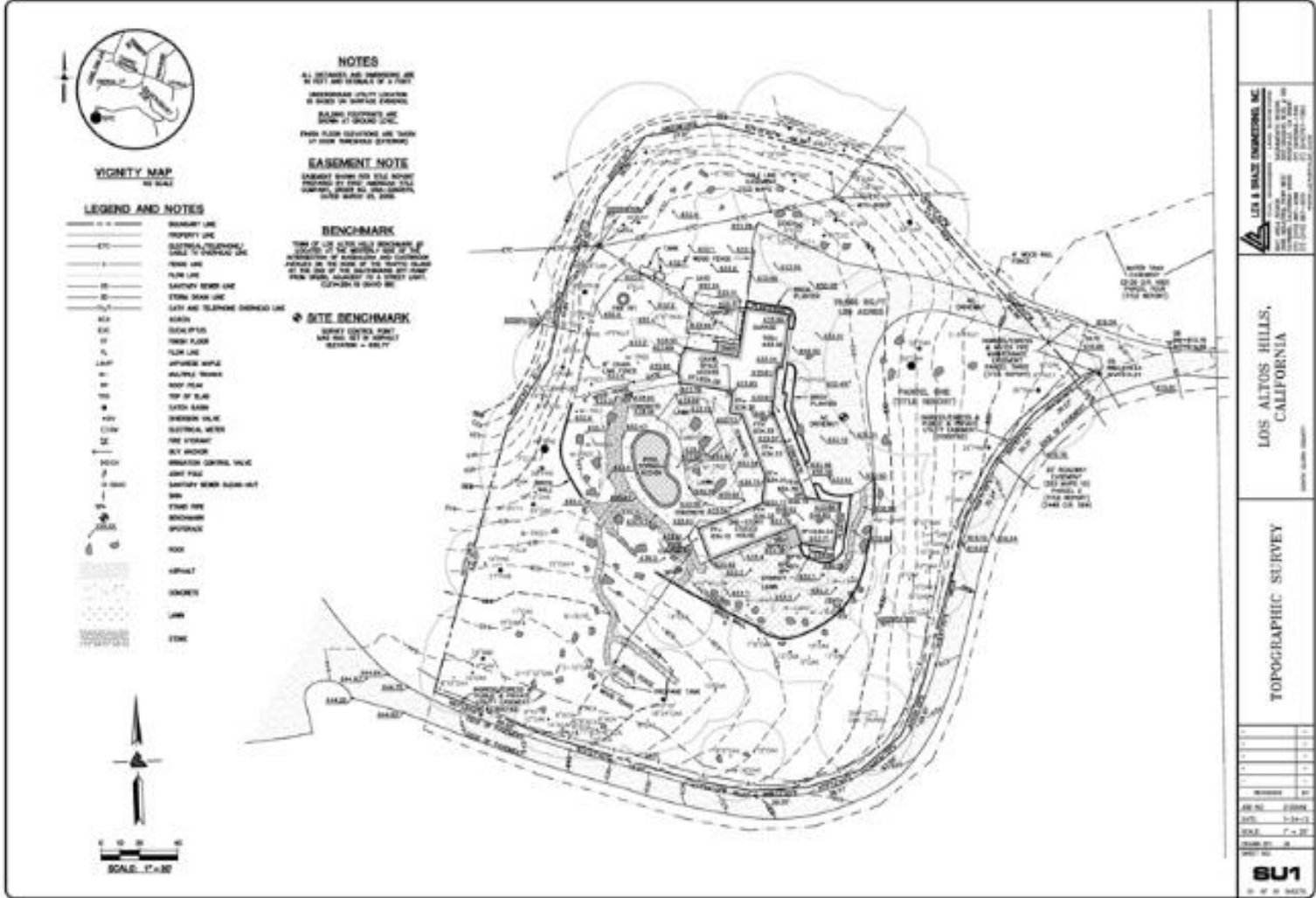
Surveying (Definition)

According to the American Congress on Surveying and Mapping (ACSM),

“Surveying is the science and art of making all essential measurements to determine the relative position of points or physical and cultural details above, on, or beneath the surface of the Earth, and to show them in a usable form, or to establish the position of points or details.”

Uses of Surveying

1. To prepare a topographical map (نقشه (جغرافیائی مطالعہ , سازی which shows hills, valleys, rivers, forests, villages, towns etc.



Uses of Surveying

2. To prepare a cadastral (زمین کی پیمائش) map which shows the boundaries of fields, plots, houses and other properties.

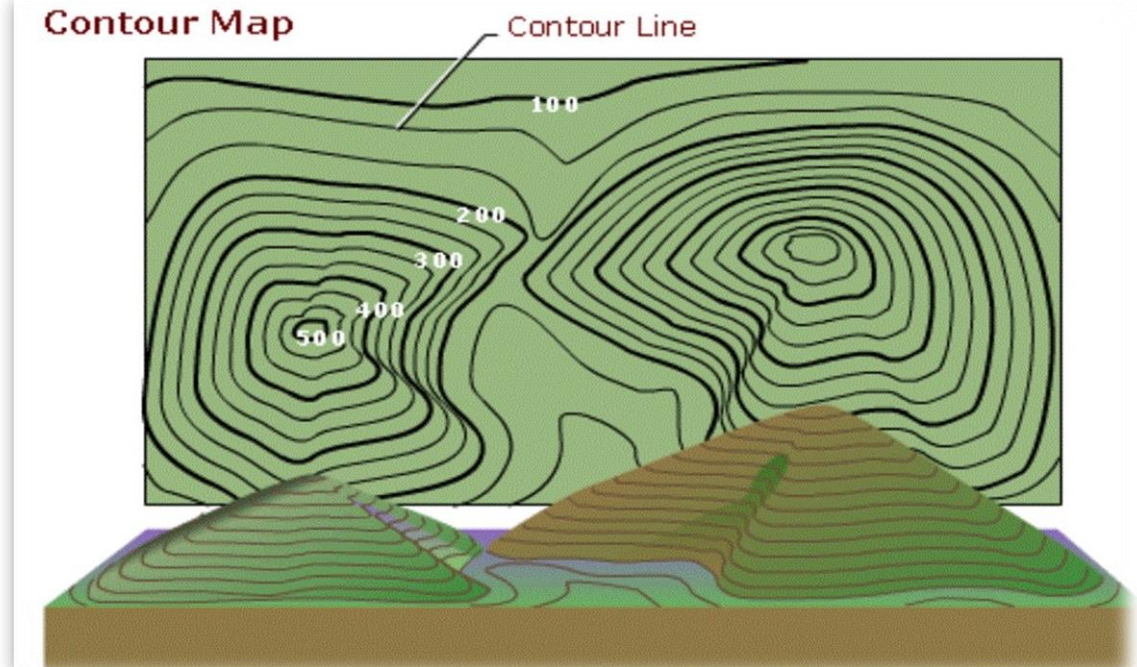
Cadastral Map



Uses of Surveying

3. To prepare an engineering map which shows the position of engineering works such as buildings, roads, railways, dams, canals.

4. To prepare a contour map to know the topography of the area to find out the best possible site for roads, railways, bridges, reservoirs, canals, etc.



Uses of Surveying

5. Surveying is also used to prepare military map, geological map, archaeological (آثار قديمه) map etc.

6. For setting out work and transferring details from the map on the ground.



Topics to be Covered

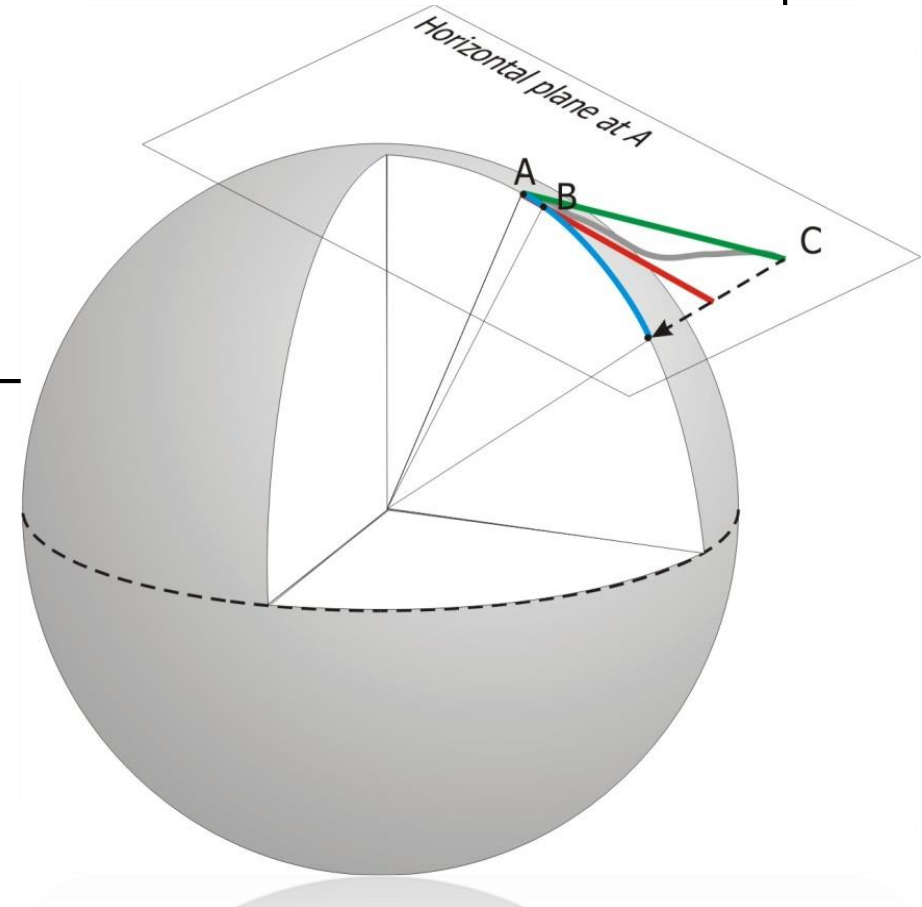
2. Definitions of basic surveying terms branches and their application

Primary Divisions of Surveying

We know that the shape of the earth is spheroidal (کرہ نما). Thus the surface is obviously curved. Surveying is primarily divided into two types considering the curvature (گولائی) of the earth's surface.

1. Plane Surveying

2. Geodetic Surveying



Primary Divisions of Surveying

1. *Plane Surveying*

The plane surveying is that type of surveying in which earth surface is considered as a plane and the **curvature of the earth is ignored**. In such surveying a line joining any two stations is considered to be **straight**. The triangle formed by any three points is considered as a **plane triangle**, and the angles of the triangle are considered as **plain angles**.

Plane Surveying is carried out for a small area of less than **250 km²**. The degree of **accuracy** required in this type of surveying is comparatively **low**.

Primary Divisions of Surveying

2. *Geodetic Surveying*

The geodetic Surveying (علم پیمائش ارض) is that type of surveying in which the **curvature of the earth is taken into account**. It is generally extended over larger areas.

The line joining any two stations is considered as **curved line**. The triangle formed by any three points is considered to be **spherical** and the angles of the triangle are considered to be **spherical angles**. Geodetic surveying is conducted for a larger area **exceeding 250 km²**

Difference between Plane & Geodetic Surveying

S. No.	Plane Surveying	Geodetic Surveying
1	The earth surface is considered as plain Surface	The earth surface is considered as Curved Surface
2	The Curvature of the earth is ignored	The curvature of the earth is taken into account
3	Line joining any two stations is considered to be straight	The line joining any two stations is considered as spherical
4	The triangle formed by any three points is considered as plane	The Triangle formed by any three points is considered as spherical
5	The angles of triangle are considered as plane angles	The angles of the triangle are considered as spherical angles
6	Carried out for a small area $< 250 \text{ km}^2$	Carried out for a larger area $> 250 \text{ km}^2$

Fundamental Principles of Surveying

The two basic fundamental principles of surveying are;

- 1. Always work from whole to part***

According to the first principle, the whole survey area is first enclosed by main stations (i.e.. Control stations) and main survey lines. The area is then divided into a number of divisions by forming well conditioned triangles.

Fundamental Principles of Surveying

2. To Work from part to the whole

To locate a new station by at least two measurements (Linear or angular) from fixed reference points

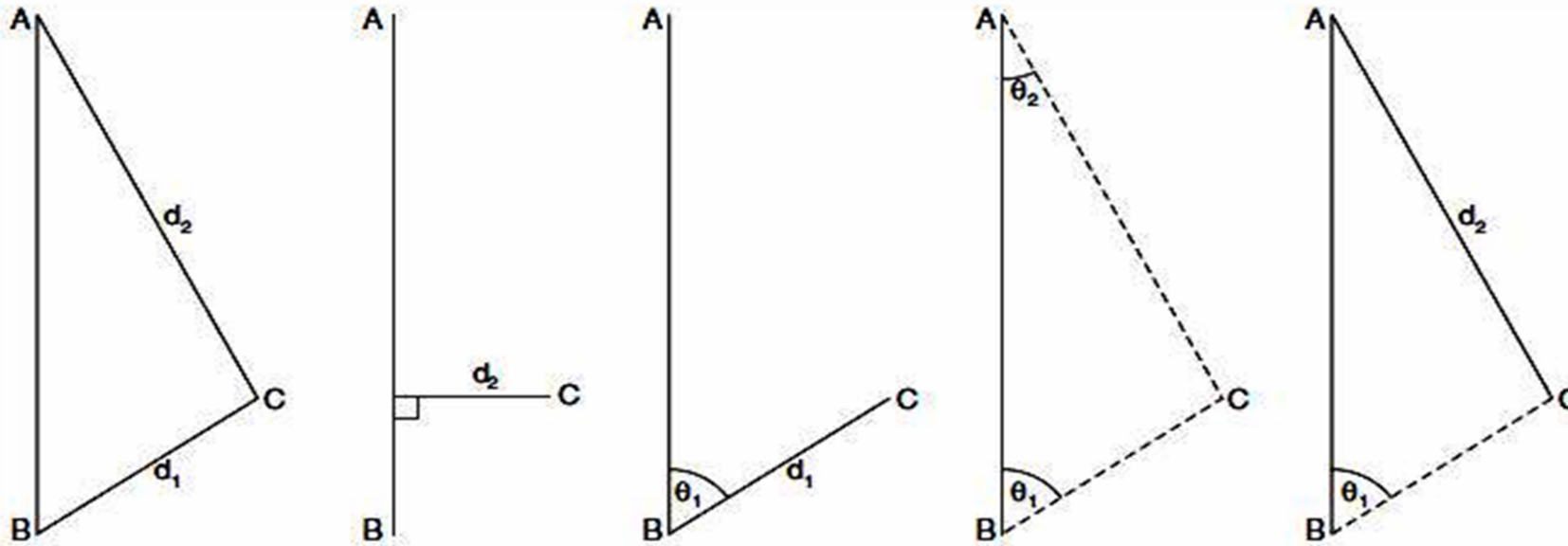


Fig. 11.3. Locating point C w.r.t. points A and B

Classification of Surveying

Classification Based on Methods

a. Triangulation

Triangulation is basic method of surveying, when the area to be surveyed is large, triangulation is adopted. The entire area is divided into network of triangles.

b. Traversing

A Traversing is a circuit of survey lines. It may be open or closed. When the linear measurements are done with a chain and a tape and the directions or horizontal angles are measured with a compass or a theodolite respectively the survey is called traversing.

Classification of Surveying

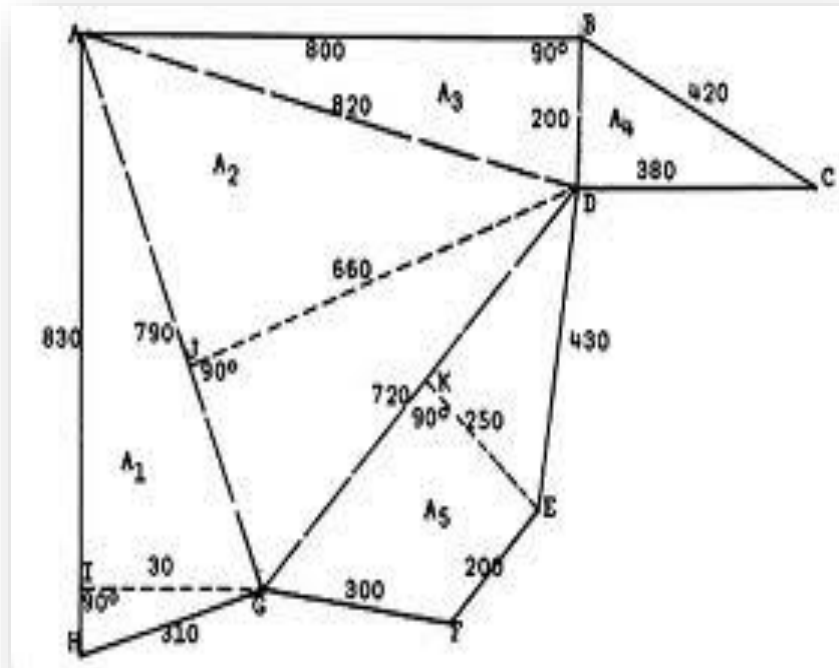


Fig: Triangulation

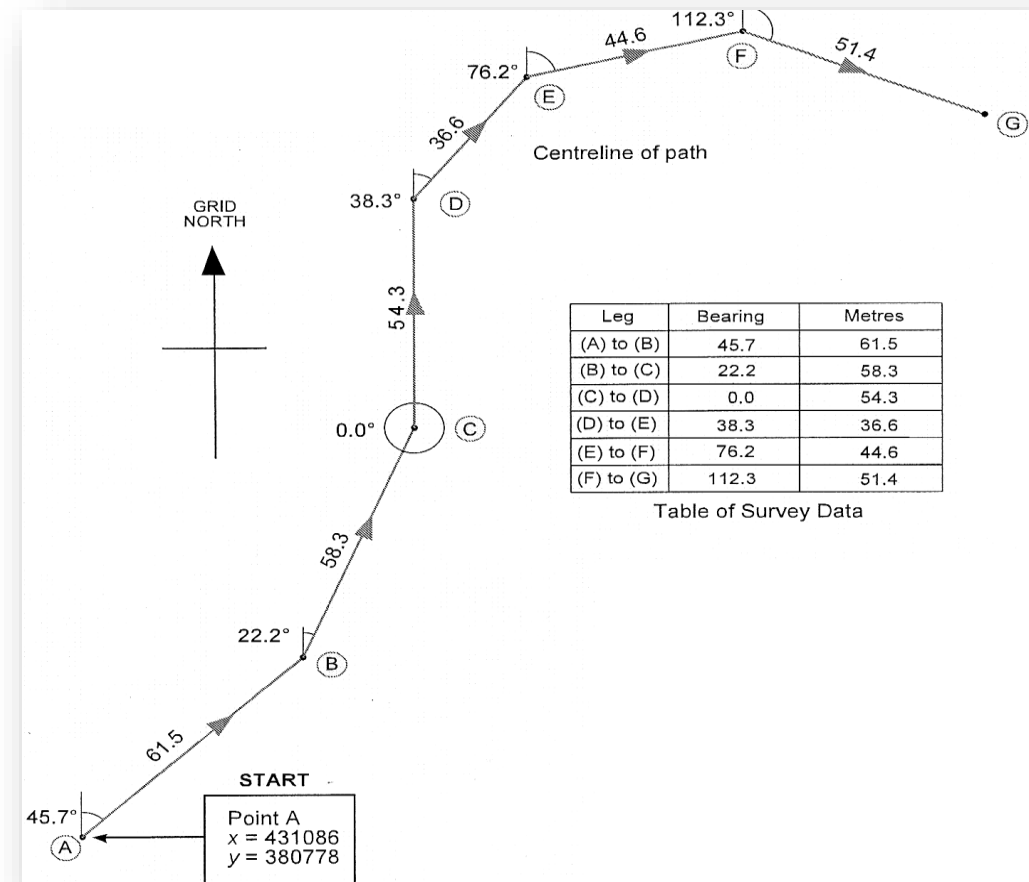


Fig: Traversing

Classification of Surveying Based on Purpose

- a. Geological Survey**
- b. Mine Survey**
- c. Archeological Survey**
- d. Military Survey**

Classification of Surveying

Classification Based on Nature of Field

- a. Land Survey**
- b. Hydrological Surveying**
- c. Astronomical Survey**
- d. Aerial Survey**

Topics to be Covered

3. Instruments used

Classification of Surveying Based on Instruments

- a. Chain Survey**
- b. Compass Survey**
- c. Chain and Compass Survey**
- d. Plane Table Survey**
- e. Theodolite Survey**
- f. Tachometry Survey**
- g. Levelling Survey**
- h. Photogrammetric Survey**
- i. EDM (Electronic Distance Measurement) Survey**

Classification of Surveying Based on Instruments

Chain Survey Instrument



Classification of Surveying Based on Instruments

Compass Survey



Classification of Surveying Based on Instruments

Plane Table Surveying



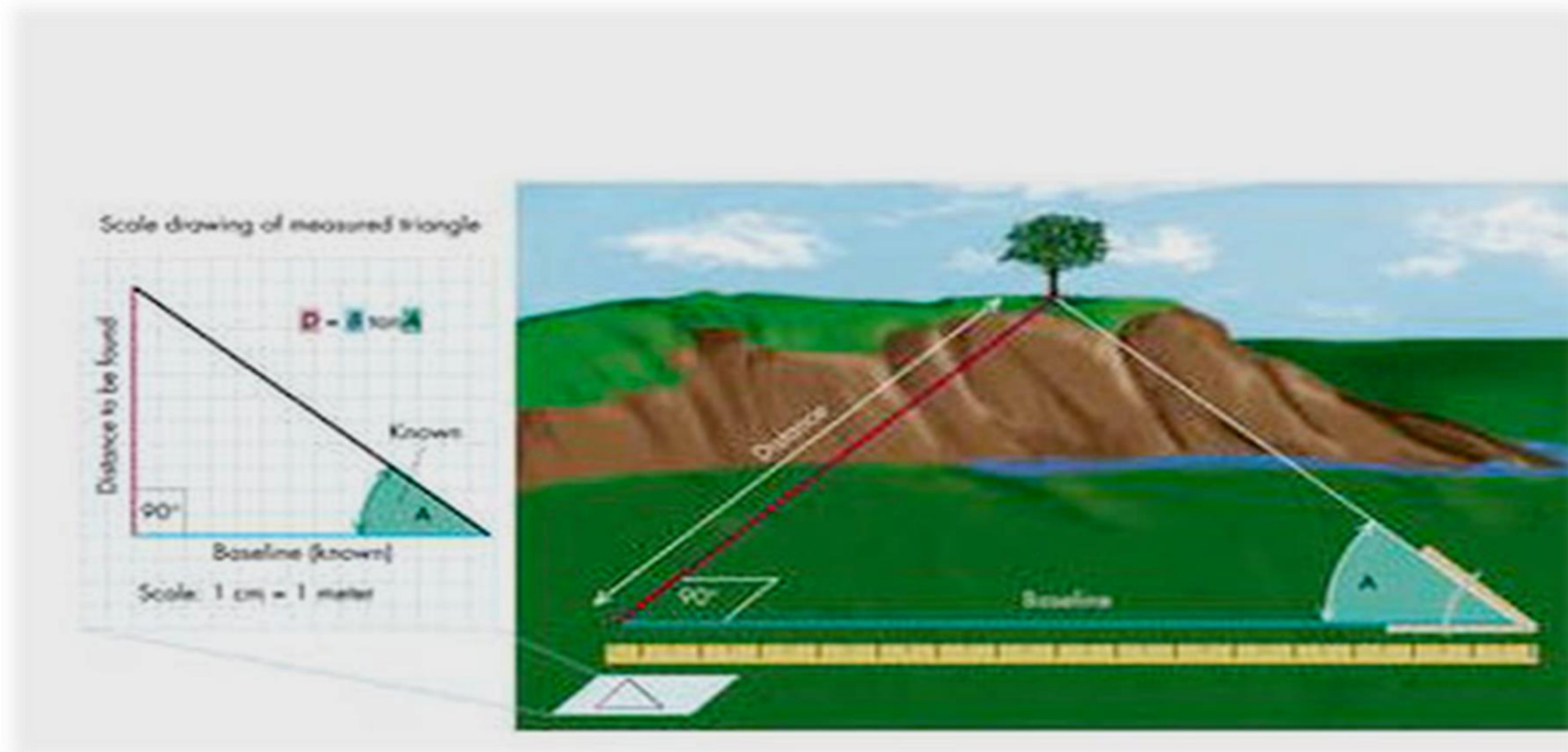
Classification of Surveying Based on Instruments

Theodolite Survey



Classification of Surveying Based on Instruments

Tachometry Survey; is a method of angular surveying in which the horizontal distance from the instrument to the staff stations are determined from instrumental observations only.



Classification of Surveying Based on Instruments

Levelling Survey



Classification of Surveying Based on Instruments

Photogrammetric or Aerial Survey



Classification of Surveying Based on Instruments

Electronic Distance Measurement Survey



Homework#1

Question No. 1: Define the Following;

- Surveying
- Triangulation
- Traversing

Question No. 2: Differentiate between Plane and Geodetic Surveying?

Question No. 3: Write different uses of Surveying?



The key
to success
is consistency.

Zak Frazer